Special Thanks **to the following people for their hard work and helping to make the JPL Information Technology Symposium 2001 a success (in alphabetical order):**

(THESE ARE FROM LAST YEAR)

Gloria Best
Steve Bridges
Chris Brokl
Weni Chang
Cara Cheung
Claudia de Luna
Andre Estrada
Sandy Gutheinz
Kimberly Johansen
Vicki Laidig
Ester Lawrence
Jim Miles
Helga Mycroft
Sandi Thomas
Kathleen Walsh
Abstract and poster presenters
Session chairs and co-chairs

All presentations will be available online after the symposium at: http://icis.jpl.nasa.gov/IT_Symposium/index.html

or

http://csmiss.jpl.nasa.gov

8:30 a.m. Introduction

8:45 - 9:30 a.m. IT PO Keynote: Dr. Richard Doyle, IT Program Office Manager

9:35 - 10:20 a.m. Technical Keynote, Vint Cerf, "Father of the Internet, co-designer of TCP/IP

10:30 a.m. Designing the Next generation Design Process – Knut Oxnevad (366D)

10:55 a.m. Communication Standards, Who Needs Them? – Peter Shames (311F)

11:20 a.m. Quantitative JPL Software Estimation Models for Cost, Size, and Defect Prediction – Jairus Hihn (311H)

11:40 a.m. Lunch (Poster Session 11:00 a.m. - 3:30 p.m.

1:30 p.m. Using scripting languages in optical interferometry – Leonard Reder (3832)

1:55 p.m. Automated Statechart Model Checking – Edward Benowitz (3459)

2:20 p.m. Advanced methodology for capturing product metadata – Kalyani Rengarajan (7900)

2:40 p.m. Break

2:50 p.m. Advances in Software Security Assessment and Verification Research - John Powell (5125)

3:15 p.m. Lessons Learned in Design Knowledge Capture – Lynne Cooper (3460)

3:40 p.m. Making Sense of rocket Science--JPL and NASA's Knowledge Management Strategies – Jeanne Holm (9540

4:05 p.m. Optimizing Spacecraft Risk Management Using Heuristic Search - Martin Feather (5125)

10:30 a.m. OurOcean - A web portal to serve near real-time coastal ocean data products – P Peggy Li (3677)

10:55 a.m. JPL Web Service Infrastructure – Susan King (366E)

11:20 a.m. Automated Software Testing for the Common Operating Environment – Eugene Jones (3697)

11:40 p.m. Lunch (Poster Session 11:a.m. - 3:30 p.m.)

1:30 p.m. Distributed Remote Agents and Global brOkers Network (DRAGON) for DSN and Missions – Yeou-Fang Wang (311I)

1:55 p.m. Monitor and Control Software for Ground Systems in the Deep Space Network – Paul Pechkam (3696)

2:20 p.m. Reducing Project Costs by Integrating Open Source and Commercial Software – Gerardo Rivera (313H)

2:40 p.m. Break

2:50 p.m. Layering IT Services for a Planetary – Norman Lamarra (3660)

3:15 p.m. Software Quality Improvement at JPL – Frank Kuykendall (3660)

3:40 p.m Information Technology Security System Engineering Methodology – David Childs (3660)

4:05 p.m. JPL/NASA and Internet 2 (I2) Abilene Backbone Network Connectivity– Josef Sherif (366G)

[redacted]

10:30 a.m. Mars Exploration Rover (MER) Surface Mission Tactical Uplink Concepts, Processes, and Tools – William Dias (312J0

10:55 a.m. Onboard Decision Making for Rover Autonomy – Forest Fisher (3672)

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1:55 p.m. Multi-Mission Telecom Analysis Tool – David Hanks (366D)

2:20 p.m. Integration of Virtual Mission (VM) and Telecom Forecaster Predictor (TFP) – Shin-Ywan Wang (3827)

2:40 p.m. Break

2:50 p.m. DSN Forecast and Scheduling Tool (TIGRAS) – Yeou-Fang Wang (311I)

3:15 p.m. Web Systems for Collaboration and Info Management: Concepts and Cassini Example – Dana Burket (3800)

POSTER LAYOUT GOES HERE

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Phytopia: Discovery of a Marine Ecosystem – Cynthia Atkinson (3812)

Phytopia is an educational CD-ROM which brings the lower end of the marine food web to life, promoting interaction with multimedia tools that enable students to discover why this ecosystem is critical. It provides interdisciplinary content and promotes active participation in scientific processes.

The Application of Natural Language Auto-Responder Technology for Mission Outreach – Douglas Hughes (3812)

JPL strives to "inspire the public with the wonder of space science and enhance science and engineering education." An important part of this effort is improving interfaces to ongoing missions and the data they generate.

Creating the Mars Orbit Insertion (MOI) Visualizations for Mars Odyssey – Zareh Gorjian (3823)

The topics of how to [redacted] information is provided to the public, [redacted] Odyssey spacecraft, the [redacted] breakdown process will be discussed. The [redacted] presented as a part of the talk.

[redacted]

Using Usability Analysis to Direct the NBS Web Site Redesign - Alix Kneifel (3190)

The NBS web site contains system status and support material for NBS applications. How do users actually use the site? How can it be more usable? We will discuss improvements-driven by usability analysis-users can expect in the near future to see on the new NBS web site.

3:40 p.m **Multi-Mission Power Analysis Tool (MMPAT)** – Eric Wood (366D)

[redacted]

10:30 a.m. **Macroservers: A new High-Level Programming and Execution Model for PIM-Based Scalable Architectures** – Hans Zima (3660)

10:55 a.m. **A Software Measurement and Fault Modeling Technique** – Allen Nikora (3459)

11:20 a.m. **An Advanced Model-Based Diagnosis Engine** – Amir Fijany (3673)

11:40 p.m. **Lunch (Poster Session 11:a.m. - 3:30 p.m.)**

1:30 p.m. **IT Infusion** – Martin Feather (5125)

1:55 p.m. **Advanced Topics in Cluster Computing** – Charles Norton (3816)

2:20 p.m. **Language Translation, Domain Specific Languages, and ANTLR** – Loring Craymer (3660)

2:40 p.m. **Break**

2:50 p.m. **Automated Specification-Based Test Case Generation Using SCR** – Allen Nikora (3459)

3:15 p.m. **Superlative TINs** – Robert Chamberlain (366D)

3:40 p.m **Architecture, Language, and Non-Compositional Constraints** – Erann Gat (3682)

[redacted]

1:30 p.m. **Toward the National Virtual Observatory** – Joseph Jacob (3677)

1:50 p.m. **Break**

1:55 p.m. **Visualization, analysis and understanding of MOC and THEMIS images** – Anton Ivanov (3824

2:20 p.m. **Cellerator: A System for Simulating Biochemical Reaction Networks** - Bruce Shapiro (367)

2:40 p.m **Break**

2:50 p.m. **Autonomous Visual Field Test & Diagnosis System In Space And On Earth** – Wolfgang Fink (3674)

3:15 p.m. Key Ingredients Needed when Building Large Data Processing Systems for Scientists – Kyle Miller (3817)

3:40 p.m. Simulation of the electric field dependent spin dynamics in semiconductor thin films – Paul A von Allmen (3816)

4:05 p.m. Animation Techniques for the Visualization of Earth Science Data Sets – Vincent Realmuto (3823)

[redacted]

1:30 p.m. Adaptive Network Communications – James McKelvey (3697)

1:55 p.m. A Message Transfer Service for Space Applications – Peter Shames (311F)

2:20 p.m. BEAM: Integrated Technology for Autonomous Self-Analysis – Ryan MacKey (3673)

2:40 p.m. Break

2:50 p.m. CLARAty: An Architecture [illegible] Robotic Soft[illegible] Issa Nesnas (3484)

3:15 p.m. Using XML as [illegible] between Flight and G[illegible] Software Systems – Colette Wilklow [illegible]

3:40 p.m Method for Measuring Centroid Algorithm Accuracy – Suzanne Klein (3826)

4:05 p.m X2000 Advanced Avionics Characterization Study – Len Day (3456)

[redacted]

1:55 p.m. Pilot Aircrew Cockpit Management (PACMAN) System – Nevin Bryant (3810)

2:20 p.m. A Cross Platform Software Installation Solution – Paul Wolgast (3697)

2:40 p.m. Break

2:50 p.m. Intermodal Corridor Analysis Tool – Nevin Bryant (3810)

[redacted]

3:15 p.m. Phytopia: Discovery of a Marine Ecosystem – Cynthia Atkinson (3812)

Engineering cont'd

propagating flight system changes to the ground system. Command and telemetry definitions are being described using XML. This presentation discusses our experiences using emerging XML technologies.

Method for Measuring Centroid Algorithm Accuracy – Suzanne Klein (3826)

The precision with which a centroid position is measured on the X,Y axis is extremely important to interferometric feedback control processes that acquire and track fringes. This paper will describe a simple but powerful method for determining the accuracy of the centroid algorithms used.

X2000 Advanced Avionics Characterization Study – Len Day (3456)

A substantial series of tests have been run on the RAD750 resulting in a body of measured numbers for actual processor performance and cache performance for a variety of software with the intent of aiding prediction of flight software performance on this processor.

[redacted]

Pilot Aircrew Cockpit Management (PACMAN) System - Nevin Bryant (3810)

JPL and Dubbs & Severino applied remote sensing to support the US Air Force's Portable Flight Planning Software (PFPS) back-up system for the navigator. Functions supported include: moving map, route display, imagery analysis, terminal area guidance, emergency checklist viewing, and emergency airport locator.

A Cross Platform Software Installation Solution - Paul Wolgast (3697)

Demonstrate the cross platform installer/builder products derived from the JSR-38 Java specification. Describe the architecture, the recent specification approval and the commercialization efforts behind our products. The installer/builder Java source and binaries will be available to attendees.

Intermodal Corridor Analysis Tool - Nevin Bryant (3810)

JPL and Tetra Tech used remote sensing to support Department of Transportation analysis of intermodal corridors in urbanenvironments. This research determined that commercial high resolution satellite data assists in providing key information currently collected by manual field analysis at great expense.

Science cont'd

Animation Techniques for the Visualization of Earth Science Data Sets - Vincent Realmuto (3823)

Scientific animation is an effective means of visualizing time-series data sets collected in the study of dynamic phenomena. We present animations featuring data from a variety of Earth Science projects and missions.

Adaptive Network Communications - James McKelvey (3697)

Space and military environments are a poor fit for protocols such as TCP/IP because of network unreliability, bandwidth limits and communication loss. We address this with a "channel" abstraction specifying the required properties, and an engine that picks the protocol and achieves the properties.

A Message Transfer Service for Space Applications - Peter Shames (311F)

Current spacecraft designs may include several processors running a real time OS, high speed networks, large data storage and intelligent peripherals. We describe an API for a Message Transfer interface suitable for use within a single spacecraft or among spacecraft flying in a constellation.

BEAM: Integrated Technology for Autonomous Self-Analysis – Ryan MacKey (3673)

BEAM (Beacon-based Exception Analysis for Multimissions) is an end-to-end system to detect faults, anomalies, and degradation in virtually any system. This talk will consider the architecture and theory of BEAM, compare to more traditional monitoring, and illustrate its use through a few examples.

CLARAty: An Architecture for Reusable Robotic Software – Issa Nesnas (3484)

Integrating various technologies onto heterogeneous robotics platforms is difficult due to variations in assumptions and capabilties among such systems. CLARAty is developing a unified and reusable framework for robot control and autonomy that provides base functionality and aims at facilitating the integration of new technologies on various robotic and rovers platforms.

Using XML as a Common Interface Between Flight and Ground Software Systems – Colette Wilklow (3684)

A new system has been developed that significantly reduces the turnaround time in

3:40 p.m **The Application of Natural Language Auto-Responder Technology for Mission Outreach** – Douglas Hughes (3812)

4:05 p.m **Creating the Mars Orbit Insertion (MOI) Visualizations for Mars Odyssey** – Zareh Gorjian **(3823)**

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Posters – held all afternoon on the JPL mall

Chair: Pat Liggett

CROSS-CUTTING THEMES

Technical Questions Database – Lynne Cooper (3460)

The Technical Questions Database is a database of questions in technical areas employed at JPL to build and operate space missions. This poster session will provide demonstrations of the TQDB and address questions regarding content, recommended use, and opportunities for contributing to it.

Tools to Support Knowledge Capture and Organization – Rebecca Nash (366N)

This presentation identifies categories of knowledge capture tools and describes the capabilities available in commercial products. It also examines what workers have implemented to organize and manage their personal knowledge and discusses the gaps between existing and desired capabilities.

INFRASTRUCTURE

Test Tracking using Web [illegible] Technology – Cindy Lush (3669) JPL

Web enabled technology is driving more and more systems and testing is yet another one. The screens will show how the task of managers and testers is made easier by knowing where the testing process is. Use of historical databases will provide some guideline to the tester in enhancing their job.

Image codecs and plugins for VICAR and PDS file formats and underlying technologies – Steven Levoe (3822)

Java image plugins for reading and writing Vicar and PDS format image files using the ImageIO API just released as a part of JDK1.4.

The JPL Supercomputing Project – Gary Gutt (366C)

The JPL Supercomputing Project provides state-of-the-art supercomputing, storage, and visualization hardware, software, and consulting services to the JPL community.

Science cont'd

Visualization, analysis and understanding of MOC and THEMIS images – Anton Ivanov (382)

Processing of large volumes of data is required nowdays to advance our understanding of processes on planet Mars. I will discuss technologies and tools which allow rapid data reduction and preparation for scientific analysis. Examples include data from Mars Global Surveyor and Mars Odyssey missions.

Cellerator: A System for Simulating Biochemical Reaction Networks – Bruce Shapiro (367)

Cellerator utilizes a palette-driven, arrow-based input syntax to drive biochemical simulations. Larger systems are represented as graphs with networks in each node. Reactions are translated into ODES using mass-action, enzymatic, allosteric and connectionist models, and can solved numerically.

Autonomous Visual Field Test & Diagnosis System In Space And On Earth – Wolfgang Fink (367)

Vision is the primary sense used by astronauts in space and people on Earth. The 3D Amsler grid test (Fink/Sadun) accurately quantifies visual field loss (www.wfbabcom5.com/wf335.htm) and is the core element of a future autonomous visual field diagnosis system in space (shuttle, ISS) and on Earth.

Key Ingredients Needed when Building Large Data Processing Systems for Scientists – Kyle Miller (381)

Why is building a large science software system so painful? Weren't teams of software engineers supposed to make life easier for scientists? Early consideration of a hidden set of science-critical software properties would promote better science and prevent prolonged waste and frustration.

Simulation of the electric field dependent spin dynamics in semiconductor thin films – Paul A. von Allmen (3816)

We will present a numerical solution to a time dependent diffusion equation that describes the diffusion of a precessing spin distribution across an interface. A time dependent transmission coefficient at the interface is mimicked by a localized time dependent diffusion constant.

Research Frontiers (cont'd)

developers and system administrators such as the effect high performance networking and the impact of new cluster architectures like Rack Saver's Bladerack and Apple's XServe systems.

Language, Translation, Domain Specific Languages, and ANTLR – Loring Craymer (3660)

ANTLR enables the rapid development of domain- specific languages for converting ad hoc problem specifications into problem solutions (code or interpreted actions). We will discuss the development of domain-specific language translators, including examples of use at JPL.

Automated Specification-Based Test Case Generation Using SCR – Allen Nikora (345)

As the complexity of mission software increases, it becomes increasingly more difficult to manually generate test cases. We describe the results of applying a prototype test case generator, developed as part of the Software Cost Reduction (SCR) toolkit, to a reusable mission software component.

Superlative TINs – Robert Chamberlain (388)

A triangulated irregular network (-TIN) is a piecewise planar model of a surface and can be very efficient. This research includes deduction of structural "richlines", constrained Delaunay triangulation, and new TIN refinement and annealing algorithms that will, we hope, produce superlative TINs.

Architecture, Language, and Non-Compositional Constraints – Erann Gat (3070)

It is useful to distinguish between (compositional) constraints on the structure of a software system and (non-compositional) constraints on the mechanisms for constructing that structure. We apply this idea to the problem of generating safe and reliable spacecraft autonomy software.

Toward the National Virtual Observatory – Joseph Jacob (367)

The Digital Sky Virtual Observatory task provides desktop access to supercomputing applications that are relevant to the National Virtual Observatory. The culmination of these efforts is the yourSky astronomical image mosaicking server, which allows highly customized access to multi-TB datasets.

Posters – held all afternoon on the JPL mall

Chair: Pat Liggett

Infrastructure cont'd

New Generation of Image Display Components using Java – Robert Deen (3825)

We will describe two Java-based image display components, and provide a live demo of them. The first is a high-performance, multi-threaded image display capable of displaying huge (>2GB) images. The second is a stereoscopic component which can use either hardware or anaglyph display methods.

Implementing a Native XML Database – Paul Springer (3816)

This poster describes the development of a native XML database. It details why XML was chosen, and will give an overview of some of the tools being developed or purchased for maintaining and querying the database.

Software Process at JPL - John Diehl (3825)

Provide a basis for developing a software development process by providing sample processes and initiating a dialog to enable the identification a good software development process and construction of a software development process Utilization of a software development process to improve performance.

Software Quality Improvement and You – Trisha Jansma (3810)

JPL's Software Web Site provides our software community with easy access to requirements, guidance, document templates, examples, services, tools, and training to support the software development life-cycle. This session includes a Web site demo and highlights of various SQI products and services.

Inside JPL -- A New Portal to Our Cyberspace – Jane Dutra (366N)

Inside JPL portal was deployed on Aug. 12, and is expected to eventually replace ELIAS, which is no longer upgraded. In this poster session, we will demonstrate to the audience the portal's functionalities and its personally customizable features.

Posters – held all afternoon on the JPL mall

Chair: Pat Liggett

MISSIONS

MISR Data Access and Visualization Using misr_view – Jeffrey Hall (3823),

misr_view is an IDL-based and graphical user interface-driven display and analysis tool for use with many types of MISR and AirMISR data. It is specificially designed for use with those MISR and AirMISR files that use the HDF-EOS "grid" interface.

Creation and Use of High detail Mars terrain – Herbert Siegel (3677)

Martian terrains large enough to support Entry, Descent, and Landing (EDL) will be 100 kilometers across and detailed enought to support Rover navigation will have 1 centimeter resolution. These kind of terrains require parallel computing for timely generation.

Reusable Software Services for Science Data Systems – Dana Freeborn (3814)

The Earth Science Data Systems section (381) is developing a ground data system framework that accommodates all orbiting missions, is hardware independent, is database independent, provides interoperability between mission operations and science analysis, is adaptable to mission-specific needs and allows data sharing from multiple distributed mission repositories.

Creation of Surface-Based Image Mosaics for MER/FIDO) - Robert Deen (3825)

We will describe the software architecture and some of the algorithms used by MIPL to create Mars surface mosaics and related products. These will be used operationally by MER. A library provides multimission interfaces while a set of applications implement the mosaic algorithms.

RESEARCH FRONTIERS

Finite Element Mesh Adaptation with PYRAMID – John Z Lou (3675)

The PYRAMID parallel unstructured adaptive mesh refinement software, developed under the ESTO Computational Technologies project, and its potential for supporting large structural modeling problems is described.

Missions (cont'd)

Multi-Mission Power Analysis Tool (MMPAT) - Eric Wood (366D)

The Multi-Mission Power Analysis Tool (MMPAT) provides variable-fidelity power modeling capabilities useful throughout the project lifecycle. It can be employed as a stand-alone desktop tool providing tabular and graphical output or integrated with activity planning tools such as APGEN.

Macroservers: A new High-Level Programming and Execution Model for PIM-Based Scalable Architectures – Hans Zima (3660)

This talk will discuss the design of "macroservers", an innovative programming and execution model for an emerging class of parallel architectures based on Processor-in-Memory (PIM) technology. Macroservers provide a framework for dealing with key issues arising in PIM-based parallel systems.

A Software Measurement and Fault Modeling Technique – Allen Nikora (345)

This presentation describes a method for estimating a software system's fault burden prior to test, based on measurable structural characteristics of that system. Practical issues associated with implementing this technique as also discussed.

An Advanced Model-Based Diagnosis Engine – Amir Fijany (3673)

We present a new approach to develop a powerful model-based diagnosis engine. Using a powerful yet simple representation, we map the problem onto two well-known problems, i. e., the Boolean Satisfiability and 0/1 Integer Programming problems. We present the results of benchmarking of our engine.

IT infusion – Martin Feather (512)

Infusing IT technology is a perennial challenge. The Technology Infusion and Maturity Assessment approach of Cornford & Hicks is shown applied to an example of IT infusion: model-based V&V of spacecraft software. It highlights what the real problems are, and what can be done to best address them.

Advanced Topics in Cluster Computing – Charles Norton (381)

This presentation will cover advanced issues in cluster computing of interest to application

Missions cont'd

Rover Sequencing and Visualization Program (RSVP) for MER) – Brian Cooper (3483)

Rover Sequencing and Visualization Program (RSVP) will be used in the Mars Exploration Rovers mission for data visualization and command sequence generation. RSVP has a data driven, user friendly interface for all rover commands and unique computer graphics for sequence visualization & rehearsal.

Image Correlation Quality Control enabled by Cluster Computing – Gerhard Klimeck (3816)

Cluster computing is used to reduce the total computation time of existing mars image processing software by over an order of magnitude to be near real time.

Multi-Mission Telecom Analysis Tool – David Hanks (366D)

MMTAT is a fast, easy to use, easy to integrate telecom subsystem analysis tool that engineers can use to rapidly perform trade studies not only by themselves but in coordination with other subsytem engineers as well.

Integration of Virtual Mission (VM) and Telecom Forecaster Predictor (TFP) – Shin-Ywan Wang (3827)

The Virtual Mission (VM) System is integrated with a remote subsystem performance analysis tool, TFP (Telecom Forecast Predictor), to update telecom parameters sensitive to the operational conditions as the simulation progresses. The integration employs an XML-based request protocol.

DSN Forecast and Scheduling Tool (TIGRAS) – Yeou-Fang Wang (311I)

TIGRAS is a Windows application for DSN resource allocation planning and scheduling using the concept of Integrated Analysis Environment (IAE). TIGRAS has sophisticated forecast and scheduling algorithms. It also provides an integrated graphical analysis environment linking to various data sources.

Web Systems for Collaboration and Info Management: Concepts and Cassini Example – Dana Burket (3800)

A report on development of mission support systems, such as Cassini Information Management System (CIMS), built with current web-based information technologies. The systems offer cost reduction, risk reduction, and improved communications in comparison to more traditional operations software.

Posters – held all afternoon on the JPL mall
Chair: Pat Liggett

A Study of the Common Component Architecture (CCA) Forum Software – Daniel Katz (3677)

The contributions of this poster are qualitative and quantitative examinations of the Common Component Architecture (CCA) software as applied to an example application (in Fortran) that includes an unstructured adaptive mesh refinement (AMR) library.

Modeling of Disordered Multimillion Atom Quantum Dot Systems – Fabiano Oyafuso (381)

Cluster computing is presented as a key enabling technology for the simulation of nanoelectronic systems consisting of several million atoms. The development of a nano-electronic device simulator is presented.

SCIENCE

MISR's Cloud Retrievals using Pattern-Matching Algorithms – Catherine Moroney (381)

MISR's cloud retrievals rely on matching coincident features between the multi-angle views. The stereo-matchers developed for this task will be discussed, and examples of their performance shown.

Multi-Image Tie-Point Detection Applied to MISR Image Georegistration – Jia Zong (381)

An automatic tie point detection algorithm, which hierarchically extracts multiple conjugate image patches and matches interest points with a combined of relational-based and area-based matcher, was applied successfully to the georegistration of the multi-angle MISR and the air-born MISR imagery.

Memory-Resident Cooperative Portable (MCP) revisions to the VICAR Library – Barbara McGuffie (3824)

VICAR is the primary planetary science image processing environment. It preserves a legacy of 40 years of NASA mission code. However, the code is not designed for modern computer networks. We are modifying VICAR to share and use memory more efficiently; and, execute in parallel environments.

Posters – held all afternoon on the JPL mall

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Science cont'd

Object-oriented Design of Simultaneous Bundle Adjustment Software for the Georectification of Multi-Angle Imaging SpectroRadiometer (MISR) and Airborne Multi-angle Imaging SpectroRadiometer (AirMISR) – Mike Smyth (381)

This poster describes the design of the software used to do the camera calibration and georectification of MISR and AirMISR. We focus on portion of the software which uses automatically collected tie points to perform corrections to the camera calibration and ephemeris and attitude error models.

ENGINEERING

An IDL widget for signal processing with the Empirical Mode Decomposition method – Benny Cheng (3244)

We demonstrate an IDL widget program that implements the Empirical Mode Decomposition (EMD) method for signal processing.

WIGLAF - A Web Interface Generator and Legacy Application Facade – Akos Czikmantory (3812)

WIGLAF is a framework that enables the simplified use of cluster computers. The application software is presented to the user in a simplified form and enables its operation without intricate knowledge of cluster or parallel computers.

The Need for Common Information Ontologies – Joseph Hutcherson (3697)

Gathering prodigious amounts of data is easy; extracting useful information from it is difficult. The JPL developed Shared Net implements a common object model representing high-level information from disparate sources, enabling advanced information sharing and automated decision support.

A Novel Approach to Information Distribution in a Complex Distributed Environment – Joseph Hutcherson (3697)

Getting the right information to the right person at the right time is a universal problem; sporadic network communication makes it nearly impossible. The JPL developed Shared Net provides a means to balance a user's information needs with the associated cost of collection and delivery.

Infrastructure cont'd

essential to have software tools that provide assistance across projects. The use of "Open Source" software can facilitate assimilation of data and development of software. Three applications will be discussed.

Layering IT Services for a Planetary – Norman Lamarra (3660)

The "web services" concept builds applications from components in different locations. We propose a vision in which missions leverage each others' resources to provide an " exploration web". Rovers, landers, and orbiters can utilize all assets more effectively in a progressively richer environment.

Software Quality Improvement at JPL – Frank Kuykendall (3600)

JPL has initiated the Software Quality Improvement Project to improve the quality of the software developed and acquired at JPL. This presentation provides an overview of the improvement effort, with an emphasis on how it is expected to affect software practitioners.

Information Technology Security System Engineering Methodology – David Childs (3660)

A methodology is described for system engineering security into large, flight project, ground data systems. The methodology is an integration of a risk management process and a generic system development life cycle process.

Mars Exploration Rover (MER) Surface Mission Tactical Uplink Concepts, Processes, and Tools – William Dias (312J)

In January 2004, Mars Exploration Rover will land two rovers at near-equatorial sites, using airbags and Pathfinder-style landers. We plan to roll at least 600 meters and get science on at least six targets each. This is how we intend to develop and validate the plans, sequences, and commands for both of them fast enough to accomplish that – about 17 hours.

Onboard Decision Making for Rover Autonomy – Forest Fisher (3672)

This presentation focuses on onboard decision-making capabilities for autonomous generation, execution, monitoring and modification of rover command sequences. This work aims to reduce rover mission operations complexity and to increase science return by performing more tasks per command cycle.

Infrastructure cont'd

JPL Web Service Infrastructure – Susan King (366E)

ICIS supports a new web hosting architecture providing enhanced scalability and reliability. Partnering with web development groups allows enterprise level integration of website development and hosting services, offering JPL institutional and outreach elements quality end-to-end web services.

Automated Software Testing for the Common Operating Environment - Eugene Jones (3697)

Given aggressive software schedules, detailed regression testing competes with fix validation for limited resources. To aid in the regression testing, an automated software-testing tool process has been implemented. This presentation reviews our observations of the tool's successes and limitations.

JPL/NASA and Internet 2 (I2) Abilene Backbone Network Connectivity – Josef Sherif (366G)

Internet2 brings together resources from academia, industry and government to develop new technologies such as IPv6, multicasting and (QoS).This enables new applications such as digital libraries, virtual laboratories, and tele-immersion. JPL connectivity to I2 is very valuable.

Distributed Remote Agents and Global brokers Network (DRAGON) for DSN and Missions – Yeou-Fang Wang (311I)

A multi-tier service-centric system called Distributed Remote Agents and Global brOkers Network (DRAGON) is used for DSN resource allocation and spacecraft design. A Web service layer is provided to access DRAGON through XML using HTTP. The current system is implemented using Microsoft.NET.

Monitor and Control Software for Ground Systems in the Deep Space Network - Paul Pechkam (3696)

The software infrastructure of Network Monitor and Control (NMC) facilitates the flow of monitor data or control directives between many pieces of equipment in the Deep Space Network (DSN). The distributed client-server architecture provides a reliable and extensible platform for 24/7 operations.

Reducing Project Costs by Integrating Open Source and Commercial Software – Gerardo Rivera (313H)

To meet requirements for software efficiency while meeting budgetary constraints, it is

Posters – held all afternoon on the JPL mall

Chair: Pat Liggett

EDUCATION

JPL 101 – Lynne Cooper (3460)

JPL 101 is a database of JPL organizational knowledge which serves as an educational resource and entry point to explore the abundance of electronic and other resources available. The poster session will demonstrate JPL 101 and address questions on content, use, and how to contribute to it.

BUSINESS SOLUTIONS

Promoting the Interests of the Laboratory: Creating Interactive Web Solutions - Cara Cheung (366M)

The Web Systems Applications group has a long history of developing and supporting creative, innovative Web solutions and information systems. This poster session will demonstrate some of the reuseable and customizable Web applications we have designed that enhance the JPL infrastructure.

JPL IT Facilities Engineering and Multimedia Systems Support - Kathya Zamora (366K)

The JPL IT Facilities Engineering and Multimedia Systems Team provides IT Systems Support and Complete IT Integration services to the JPL community. The group offers a 'one stop shop' for all IT needs.

Using Electronic Libraries to Handle Documents – V. Piette (9510)

A number of very good on-line, web-based document handling systems are easily and inexpensively available to JPL users. The most widely used electronic library at JPL is called DocuShare. In this presentation, we use DocuShare to demonstrate the advantage of storing documents in an electronic library.

Designing the Next Generation Design Process – Knut Oxnevad (366D)

The Next Generation Project Development Teams (NPDTs) at JPL provides customers with state-of-the-art Concurrent Analysis, Simulation, and Design environments for the early design stages that emphasizes a total Systems approach, and features Multi-Disciplinary design teams.

Communication Standards, Who Needs Them? - Peter Shames (311F)

Future missions push the boundaries of what has been done before. There are many interdependencies for relay communications, navigation and instrument hosting with national and international partners. Tested data system standards reduce risk and facilitate interoperability, and cross support.

Quantitative JPL Software Estimation Models for Cost, Size, and Defect Prediction – Jairus Hihn (311H)

This presentation will focus on the results of the SQI's Measurement and Benchmarking activities to develop quantitative cost, size, and defect estimation models based on the analysis of JPL data to support planning and indicators of overall software trends at the lab.

Lessons Learned in Design Knowledge Capture – Lynne Cooper (3460)

This presentation describes on-going efforts to improve design knowledge capture. Included will be descriptions of what types of products can be generated, how these products could be used in the design teams, opportunities and limitations of existing technology, and near term capabilities.

Automated Statechart Model Checking - Edward Benowitz (3459)

We've established a mechanism, based on formal methods, for automated translation of Stateflow® statecharts into Promela, the input language of the SPIN model checker. Our method permits verification of mission critical software designs with the exhaustive exploration techniques of model checking.

Advanced methodology for capturing product metadata – Kalyani Renjarajan (7900)

We will discuss an advanced methodology for capturing metadata using XML-DTD driven, reusable GUI application. The prototype software developed for an instrument testbed can be adapted to support other science product metadata capture. Future plans to migrate to XML schema will also be discussed.

Cross-cutting Themes cont'd

Advances in Software Security Assessment and Verification Research – John Powell (5125)

NASA has funded research to develop software security assessment insturments for the software life cycle. They include a Vulnerability Matrix (VMatrix), Security Assessment Tools (SATs), a Property Based Tester (PBT), Model Based Verification (MBV), and a Software Security Checklist (SSC).

Using scripting languages in optical interferometry - Leonard Reder (3832)

The Keck Interferometer Project is an optical interferometer utilizing the two 10 meter telescopes of the W. M. Keck Observatory with primary goal being the detection of extra-solar planets. The talk presents examples demonstrating how standard middleware (e.g. CORBA) is used.

Making Sense of Rocket Science – JPL and NASA's Knowledge Management Strategies – Jeanne Holm (9540)

The successful implementations of knowledge management systems and practices at NASA and JPL, ranging from the OneNASA portal (that will replace the NASA home page) to JPL's Technical Questions database, have brought acclaim to NASA's and JPL's Knowledge Management projects.

Optimizing Spacecraft Risk Management Using Heuristic Search – Martin Feather (5125)

Risk reduction is critical to mission success, yet reduction measures cost time, $, etc. We show the role of heuristic search techniques (Simulated Annealing, Genetic Algorithms and Machine Learning) in determining an optimal risk-reduction strategy, balancing value of risk reduction against cost.

Our Ocean - A web portal to serve near real-time coastal ocean data products – P. Peggy Li (3677)

OurOcean is an end-to-end system for data retrieval, archival, processing and distribution with a focus on the East Pacific Ocean wind. Live Access Server (LAS) is used as the web-based data server and Ferret Visualization and Analysis System is used as the visualization tool.